European Water 33: 29-32, 2011.

Exploitation of the Wasted Nile Water in the Mediterranean Sea

M. Yousif
Desert Research Center, Geology Department, P.O.B. 11753 El Matriya, Cairo, Egypt
fax.: +202-26357858, email: yousif_mohamed80@daad-alumni.de and mohamed.youssef@geog.uni-heidelberg.de

Abstract: The wastage of the Nile water in the Mediterranean Sea was estimated. It ranges between 11 and 14 billion m3. This water has a significant figure which could change the modern future of Egypt. The paper aims to pay attention to the possibility of providing 5 billion m3 of the Nile water which is wasted every year with avoiding of the environmental side effects on the Nile Delta. The paper discusses the problems which can happen and suggest a proposed plan to save a part from the wasted Nile water.

Keywords: Egypt, Nile water, Environment, Proposed plan.

1. INTRODUCTION

Egypt has always depended on the water of the Nile River. Before the building of a dam at Aswan, Egypt experienced annual floods from the Nile River that deposited four million tons of nutrient-rich sediment which enabled agricultural production. This process began millions of years before Egyptian civilization began in the Nile River valley and continued until the first dam at Aswan was built in 1889. This dam was insufficient to hold back the water of the Nile and was subsequently raised in 1912 and 1933. In 1946, the true danger was revealed when the water in the reservoir peaked near the top of the dam. Then, Egypt decided to build a High Dam at Aswan. The Aswan High Dam (AHD) benefits Egypt by controlling the annual floods on the Nile River and prevents the damage which used to occur along the floodplain. The AHD provides about a half of Egypt's power supply and has improved navigation along the river by keeping the water flow consistent. There are several problems associated with the dam as well. Seepage and evaporation accounts for a loss of about 12-14% of the annual input into the reservoir. The sediments of the Nile River, as with all river and dam systems, has been filling the reservoir and thus decreasing its storage capacity.

Through the Nile Water Agreement with Sudan in 1959 and the completion of the AHD in 1968, a stable 55.5 billion m^3/year was allocated to Egypt. The release from the dam ranges from approximately 800 m^3/second during the winter closure period to nearly 2,760 m^3/second during the summer months (Abdel-Shafy and Aly, 2007).

2. DISCUSSION

The annual discharge of agricultural drainage water estimates varies due to different factors, such as the management of the irrigation system, crop pattern and irrigation efficiency. The effect of reducing the quantity of water released from the Aswan High Dam (AHD) on the quantity and quality of drainage water is shown in Table 1. The decrease in the Nile water flow downstream AHD was due to the shortage in supply caused by the drought in the Horn of Africa. The Ministry of Public Works and Water Resources imposed strict policies for the release and distribution of the Nile water downstream AHD. Further decrease in drainage water quantity and increase of its salinity will occur when the irrigation efficiency is improved both in the conserving system and at farm level. The wastage of the water in the Mediterranean Sea was estimated (Abu Zeid, 1995), it

ranges between *11 and 14 billion m³* (average annual 12.8 billion m³). This water has a significant figure which could change the modern future of Egypt.

FAO report (Hundertmark and Salman, 2005) estimated that the strategic water budget of Egypt is 55.5 billion m³ reaching via the Nile River, most is used for irrigation along the Nile Valley and the Nile Delta, leaving approximately *14 billion m³* flowing out to the sea. This so-called "official" reuse rose from 2.6 billion m³ in 1988/89 to levels of 5.0 billion m³ in 1998/99. The present aim of the Government of Egypt is to reuse up to 8 billion m³ (IPTRID, 2004).

This paper aims to pay attention to the possibility of providing some of the Nile water which is wasted every year in the Mediterranean when the Nile falls into the sea at Rosetta and Damietta branches, with avoiding the environmental side effects on the territory of the Delta. The important aim of this idea is to provide nearly 5 billion m³ of the Nile water that is wasted in the Mediterranean Sea and establishment of an agricultural area in the Western Desert. The solution can be included in transporting of 5 billion m³ of the Nile water to the Western Desert through the pipes to avoid the loss of water by evaporation due to the rise in temperature. This pipe line will transfer the water which will be pumped from the Nile, which is then withdrawn through an irrigation network, and will be used for the cultivation of areas to be reclaimed in the Western Desert. The end of the pipe line will be in the low depression (Qattara Depression) which will use for draining water excess, if any (Fig. 1).

Table (1): The Nile water flow downstream Aswan High Dam (AHD) and drainage water flowing to the Sea (Abu zeid, 1995)

Year	Nile water	Drainage water	
	Downstream AHD (Billion m³)	Quantity (Billion m³)	Salinity Mmhose/cm
1984-1985	56.40	14.12	3.71
1985-1986	55.52	13.86	3.68
1986-1987	55.19	13.03	3.64
1987-1988	52.86	11.87	4.15
1988-1989	53.24	11.13	4.63

One path is suggested to transport water for a distance (about 250 km) with taken into taking into consideration the topographical nature of the Western Desert to avoid the pumping of water for a great distances. Water is supposed to be pumped and raised at one point from the Nile River to go inside water pipes. The pipe line should then extent along the suggested path (Fig. 1). This idea can provide Nile water, which qualifies for the new communities and increasing the national income, in addition to solving a part of the problem of population density and provide new job opportunities. Some problems are expected to carry out the water transfer, these problems are as follows:

1. Executive problem: represented in the chosen, the preparation and implementation of a suitable place to contain the amount of five billion m³ of water.
2. Environmental problem: represented in the probability of increasing the erosion at the Damietta and Rosetta as a sub-result of the decline in the quantity of the Nile water flowing to the Mediterranean Sea.
3. Sea water intrusion: is the probability of occurrence of salting in some of Nile Delta lands as a result of the progress of seawater intrusion due to reduce the amount of Nile water flowing to the sea.

Some ideas are suggested to overcome the mentioned problems. For the problem of beaches erosion, which in the Rosetta and Damietta branches, as well as the transgression of seawater, it is possible to avoid this by building dams, one at the Rosetta and the other at Damietta. The dams should be designed as a half circle to avoid attacking of the sea (Fig. 1). In addition, series of rock and repel waves should be placed on the back of dams which work for disperse and weaken strength of the waves. In this case another problem will appear; where the waves can withdraw the sand which found under the dams, accordingly dams can be destroyed. This problem can be solved through injection of special material (cement against water erosion) on the earth to stabilize the

sand under the dams (this is an accepted method in the engineering study). The creation of a cement concrete resistance to seawater is very important to build the dam; this also could be implemented through the engineering study. The other important problem in this idea is the problem of sea water intrusion, where the withdrawn of five billion m^3 of the Nile water will lead to sea water intrusion. It can be solved by two trends as follows:

First trend: Exploitation of the agricultural drainage water to compensate the shortage which will occur in the water as a result to pumping of 5 billion m^3 in the pipe line.

Second trend: This is an Engineering solution; the idea is to stabilize the level of surface water in the Nile after pumping of water in the pipe line, therefore no increasing in sea water intrusion will happen, i.e. maintaining a constant water level in Nile River after the water pumping

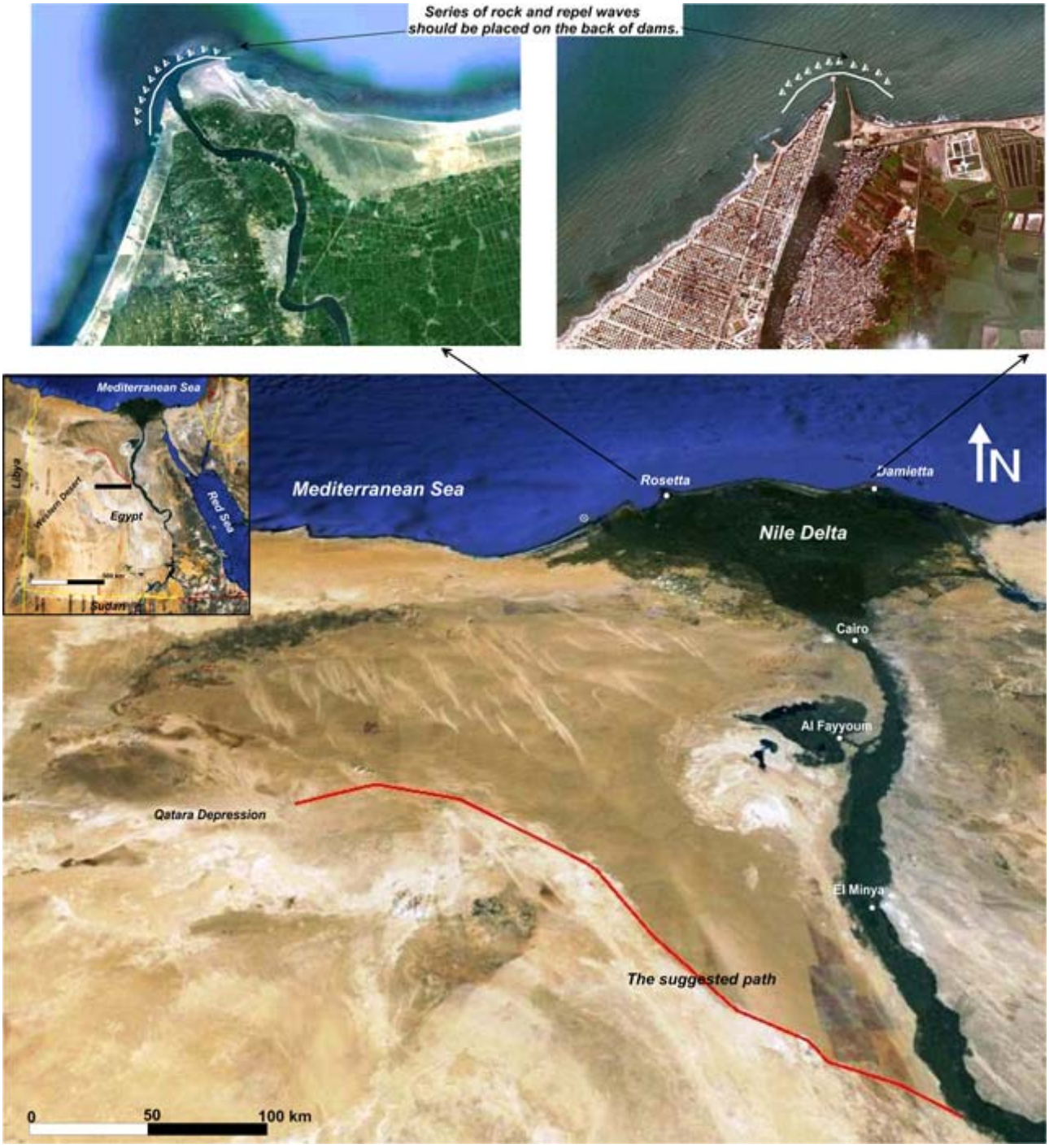

Figure 1: Showing the proposed *path of* pipeline which transports water to the Qattara Depression *and the suggested two dams in Rosetta and Damietta.*

This could happen through the establishment of a series of gates (barrages) along the branches of Damietta and Rosetta. These gates will operate through a series of vents that will control the level of surface water in the Nile.

To illustrate this idea, if we assume that the level of surface water in the Nile at the point (x) is 17 m above sea level and at the point (r) is 15 m above sea level. When we start to pump an amount of 5 billion m^3 in the pipe line, the daily rate of withdrawal will be 13.69 million m^3 (5 billion m^3/365 days). Accordingly, the water level in the Nile River will decrease after the point of pumping water in the pipe line. If we assume that this withdrawal will affect the point (x) and point (r) to reduce the surface of the water level by 2 m, in this case the gates should be locked after points (x) and (r) till the water level rise and compensate the difference of 2 m, and then the Nile will continue to flow naturally and its water level can be under control along its two branches.

3. CONCLUSION

The mentioned proposed plan is consider an innovative idea to provide amount of water which can change the future in Egypt, especially under the expected increasing of populations. Some problems are expected to carry out the water transfer; these problems are executive problem, environmental problem and increasing of sea water intrusion. Some ideas are suggested to overcome the mentioned problems and carry out the water transfer to the Qattara Depression in the western Desert. The amount of water which will be transferred can be exploited through a modern network of irrigation which can be created for using in the cultivation of the area between the Nile River and the proposed path. I think that this idea should be financed through the government of Egypt in cooperation with partners such as the European Union and the United Nations. Also, it can be suggested to establish a joint stock company to finance this project by the shares of the Egyptian people, businessmen and foreign companies. It is recommended to subjecting the idea for study by the economists.

REFERENCES

Abdel-Shafy H. I. and Aly R. O. (2007): WASTEWATER MANAGEMENT IN EGYPT. Wastewater Reuse –Risk Assessment, Decision-Making and Environmental Security, © 2007 Springer, P. 375-382.

Abu-Zeid M. (1995): Major Policies and Programs for Irrigation Drainage and Water Resources Development in Egypt. Options Méditerranéennes, Sér. B / n°9, 1995 - Egyptian Agriculture Profile, P. 33-49.

Hundertmark W., Salman M., (2005): How integrated water management systems can lead to real water savings in Egypt, Project Document, FAO, Rome, Italy. Available online at: ftp://ftp.fao.org/agl/iptrid/hiwms.pdf

IPTRID (2004): “Rapid assessment study towards integrated planning of irrigation and drainage in Egypt”. Project Document. IPTRID, FAO, Rome, Italy.